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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,746	06/19/2002	John Canning	P07477US00/MP	4409
881	7590	01/09/2004	EXAMINER	
LARSON & TAYLOR, PLC 1199 NORTH FAIRFAX STREET SUITE 900 ALEXANDRIA, VA. 22314			DONG, DALEI	
			ART UNIT	PAPER NUMBER
			2875	

DATE MAILED: 01/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/019,746	CANNING, JOHN	
	Examiner	Art Unit	
	Dalei Dong	2875	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 10/019,746.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Claim Objections

2. Claims 1, 3, 4, 19 and 22 objected to because of the following informalities: lacks the consistency in the claim of “at least three coherent beams” when referring to the “at least three coherent beams” in later independent and dependent claims, applicant is advised to utilize “said at least three coherent beams”. Appropriate correction is required.
3. Claims 23, 27, 30, 34 and 37 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims are merely claiming the application and intended use of the independent claim and thus does not further limit the parent claim.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant merely claims a “higher order grating”, however higher is a relative term and Applicant fails to establish the comparative value in which higher is referred to.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,548,225 to Hammon in view of U.S. Patent No. 5,367,588 to Hill.

Regarding to claims 1-22, Byron discloses in Figure 4, “the UV beam 61 is scanned along a phase mask 62 using a moveable mirror 72 to thereby produce two first order beams 63, 64. The beam 63 is reflected by mirrors 66, 67, 68 and 69 and then impinges upon fibre 71 at the point 70. The second beam 64 is reflected by mirrors 67, 66, 69 and 68 before impinging also at the point 70 on the fibre 71. The two beams form an interference pattern at the point 70 on the optical fibre 71. By simultaneous adjustment of at least one mirror 66, 67 above the phase mask and one mirror 68, 69 below the phase mask, it is possible to independently control the position of the beam

intersection point and the Bragg Wavelength. Further, an apodisation of the grating can be achieved without chirping of the grating" (column 5, lines 19-32).

Hammon also discloses in Figure 4, "when apodisation is required, the interference pattern 70 can be made to move off the fibre 71 to thereby apodise the grating. It will be understood that, in accordance with requirements, the positioning of the mirrors, fibre and phase mask can each be vertically displaced and adjusted so that the beams have an uninterrupted path from the phase mask 62 to the fibre 71" (column 5, lines 33-40).

Hammon further discloses in Figure 4, "utilising the arrangement 60 of FIG. 4 one can write an arbitrary chirped profile, at the same time allowing the beam intersection point to track the axis of the fibre, thereby eliminating any self apodisation. Further, the path length difference between the two beams is minimised thereby reducing the high temporal coherence requirement of the UV source. Further, this allows the spatial jitter typically present in UV sources to be more effectively controlled utilising an external feedback loop. In addition, as the path lengths have been substantially equalised, the vertical separation of the writing beams due to the slight vertical tilt applied to each mirror is also significantly reduced, thereby eliminating any unwanted self apodisation effects resulting from the vertical separation of the interfering beams. Further, as the interference point can be separately controlled, any apodisation profile can be created in the written grating" (column 5, lines 41-56).

However, Harmmon does not disclose dividing the input coherent beam into at least three coherent beams. Hill teaches "the fabrication of optical waveguide devices

such as intra-mode retro-reflecting Bragg gratings, mode convertor gratings, and rocking rotators have been achieved. The general approach for making these devices is to photoinduce a refractive index grating in the photosensitive core of the optical waveguide. The grating consists of a periodic modulation of the core's refractive index along the length of the waveguide. The period of the perturbation is chosen to bridge the momentum (propagation constant) mismatch between the two (normally bound) modes that the grating is designed to couple. At the resonant wavelength of the structure, phase-matched, efficient, power exchange between the coupled modes is possible" (column 1, lines 21-35).

Hill also teaches in Figure 1, "A phase grating slit-mask 1 is used in a precision photolithographic apparatus and is placed in contact, or near-contact, with an optical fiber 3, its grating striations 5 (as illustrated in magnification 6 of the mask) directed normal or near normal to the fiber axis. A UV light beam 7 from a suitable laser, a KrF excimer laser (249 nm) in a successful prototype is passed through the mask 1 by which it is phase modulated spatially and is diffracted to form an interference pattern 9A laterally (Bragg grating pitch) and along the incident laser beam direction 9B (Talbot pitch) as illustrated in magnification 11 of the core of the fiber" (column 3, lines 36-47).

Hill further teaches in Figure 1, "the slit-mask preferably is comprised of a one dimensional surface-relief structure as shown at 6 fabricated in a high quality fused silica flat transparent to the KrF excimer laser radiation. The shape of the periodic surface-relief pattern of the phase mask preferably approximates a square wave in profile, as shown at 6. The amplitude of the periodic surface-relief pattern is chosen to modulate by

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$\pi + 2\pi n$ radians ($n=0,1,2,3, \dots$) the phase of the UV light beam. In a successful prototype of the phase mask for a KrF excimer laser beam, the amplitude A of the surface relief pattern is given by $\frac{\lambda}{2(n_{\text{silica}} - 1)}$ where λ is the wavelength of the light used for writing (photoinducing) an index change in the optical medium, and n_{silica} is the refractive index of the silica used in forming the mask. This choice of surface-relief-grating amplitude results in a grating diffraction pattern for the design wavelength that nulls the zero-order diffracted (through) beam. In practice, the zero-order beam has been suppressed to less than 5% of the light diffracted by the mask. The principal beams exiting our mask are the diverging plus-one and minus-one orders each of which contained typically more than 35% of the diffracted light" (column 3, line 48 to column 4, line 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilize the phase mask with one dimensional surface-relief structure of Hill for the apparatus for writing grating of Hammon in order to achieve high accuracy in the translation of the optical fiber in front of the slit and permit the writing of several index perturbations in a single operation and thus reduce the exposure time of the grating.

Regarding to claims 23-40, it has been held that a recitation with respect to the manner in which a claimed apparatus and method is intended to be employed does not differentiate the claimed apparatus and method from a prior art apparatus satisfying the

claimed structural and methodical limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following prior art are cited to further show the state of the art of method and apparatus of composing a grating structure in a photosensitive waveguide.

U.S. Patent No. 5,066,133 to Brienza.

U.S. Patent No. 6,067,391 to Land.

U.S. Patent No. 6,081,640 to Ouellette.

U.S. Patent No. 6,298,183 to Yamauchi.

U.S. Patent No. 6,307,617 to Nishiki.

U.S. Patent No. 6,310,996 to Byron.

U.S. Patent No. 6,414,764 to Ouelette.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (703)308-2870 (after January 14, (571)272-2370). The examiner can normally be reached on 8 A.M. to 5 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703)305-4939 (after January 14, (571)272-2378).

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The fax phone number for the organization where this application or proceeding is assigned is
(703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the receptionist whose telephone number is (703)308-0956.

D.D.
December 31, 2003



Sandra O'Shea
Supervisory Patent Examiner
Technology Center 2800